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Appl. No. 10/719,377
Response to Office Action of July 10, 2006Patent
Attorney Docket No. 86147-14**REMARKS / ARGUMENTS**

Potential allowability of claims 5 to 9, 14 to 21 and 26 to 32 is gratefully acknowledge.

The present patent application now comprises fifty-seven (57) claims, numbered 1 to 26 and 28 to 58.

Claims 33 to 40 and 42 to 48 have been previously withdrawn. Claims 1, 10, 22, 28 and 41 have been amended. Claim 27 has been cancelled without prejudice. New claims 49 to 58 have been added.

Support for amendments made can be found throughout the specification and drawings as originally filed. No new matter has been added to the present patent application by the present response.

1. Rejection of Claims 1, 10, 22 and 41 under 35 USC 112

On page 2 of the Office Action, the Examiner rejected claims 1, 10, 22 and 41 under 35 USC 112, second paragraph, since the Examiner considers that the expression "such as" renders these claims indefinite.

In response, claims 1, 10, 22 and 41 have been amended in order to remove the expression "such as" from these claims. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claims 1, 10, 22 and 41 under 35 USC 112, second paragraph.

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2. Rejection of Claims 1, 10, 22 and 42 [sic] under 35 USC 102

On pages 3, 4 and 6 to 11 of the Office Action, the Examiner rejected claims 1, 10, 22 and 42¹ [sic] under 35 USC 102 as being anticipated by several references.

Specifically, the Examiner rejected claims 1, 10, 22 and 42¹ [sic]:

- under 35 USC 102(b) as being anticipated by U.S. Patent 6,097,971 to Hosoi (hereinafter referred to as "Hosoi");
- under 35 USC 102(b) as being anticipated by U.S. Patent 6,181,794 to Park *et al.* (hereinafter referred to as "Park");
- under 35 USC 102(e) as being anticipated by U.S. Patent 6,704,415 to Katayama *et al.* (hereinafter referred to as "Katayama");
- under 35 USC 102(e) as being anticipated by U.S. Patent 6,804,203 to Benyassine *et al.* (hereinafter referred to as "Benyassine"); and
- under 35 USC 102(b) as being anticipated by U.S. Patent 6,442,272 to Osovets (hereinafter referred to as "Osovets").

As discussed below, the Applicants respectfully submits that claims 1, 10, 22 and 41, as amended, are in condition for allowance and respectfully requests the Examiner to withdraw the rejections of these claims.

Independent claims 1, 10, 22 and 41 are reproduced below with certain elements being emphasized:

1. A method suitable for use in reducing echo in a communication system, said method comprising:
 - a) receiving a first signal including a voice component, the voice component being associated to a speaker;
 - b) receiving a second signal including an echo component, the echo component being correlated to the first signal;

¹ It is assumed that the Examiner meant to reject claim 41 and erroneously rejected claim 42 as this claim has been previously withdrawn.

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- c) processing said first signal to derive a harmonic feature of the voice component;
- d) deriving an echo reduced signal by processing said second signal to at least partly remove therefrom at least one frequency component related to the harmonic feature of the voice component; and
- e) releasing the echo reduced signal.

10. An apparatus suitable for use in reducing echo in a communication system, said apparatus comprising:

- a) a first input for receiving a first signal including a voice component, the voice component being associated to a speaker;
- b) a second input for receiving a second signal including an echo component, the echo component being correlated to the first signal;
- c) a processing unit in communication with said first input and said second input, said processing unit being operative for:
 - i. processing said first signal to derive a harmonic feature of the voice component; and
 - ii. deriving an echo reduced signal by processing said second signal to at least partly remove therefrom at least one frequency component related to the harmonic feature of the voice component;
- d) an output for releasing the echo reduced signal.

22. A computer readable medium including a program element suitable for execution by a computing apparatus for use in reducing echo in a communication system, said computing apparatus comprising:

- a) a memory unit;
- b) a processor operatively connected to said memory unit, said program element when executing on said processor being operative for:
 - i. receiving a first signal including a voice component, the voice component being associated to a speaker;
 - ii. receiving a second signal including an echo component, the echo component being correlated to the first signal;
 - iii. processing said first signal to derive a harmonic feature of the voice component;
 - iv. deriving an echo reduced signal by processing said second signal to at least partly remove therefrom at least one frequency component related to the harmonic feature of the voice component; and
 - v. releasing the echo reduced signal.

41. An apparatus suitable for use in reducing echo in a communication system, said apparatus comprising:

- a) means for receiving a first signal including a voice component, the voice component being associated to a speaker;
- b) means for receiving a second signal including an echo component, the echo component being correlated to the first signal;
- c) means for processing said first signal to derive a harmonic feature of the voice component;

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- d) means for deriving an echo reduced signal by processing said second signal to at least partly **remove therefrom at least one frequency component related to the harmonic feature of the voice component;**
- e) means for releasing the echo reduced signal.

It is respectfully submitted that none of Hosoi, Park, Katayama, Benyassine, and Osovets teaches or suggests the above-emphasized elements of claims 1, 10, 22 and 41.

Specifically, none of Hosoi, Park, Katayama, Benyassine, and Osovets teaches or suggests reducing echo in a communication system by:

- processing a first signal, which includes a voice component, to derive a harmonic feature of the voice component; and
- deriving an echo reduced signal by processing a second signal, which includes an echo component correlated to the first signal, to at least partly remove from the second signal at least one frequency component related to the harmonic feature of the voice component.

— Hosoi —

Hosoi describes an apparatus including an echo canceller that uses an FIR-type adaptive filter (c. 4, l. 61 to c. 5, l. 8; and c. 5, l. 28-40).

There is absolutely no mention or suggestion in Hosoi of processing a first signal, which includes a voice component, to derive a harmonic feature of the voice component. Since no such harmonic feature is derived in Hosoi, it is not surprising that Hosoi also does not teach or suggest deriving an echo reduced signal by processing a second signal, which includes an echo component correlated to the first signal, to at least partly remove from the second signal at least one frequency component related to the harmonic feature of the voice component.

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– Park –

Park describes an echo canceller having an adaptive filter and a fixed filter that generate first and second echo estimation signals based on the same voice signal (c. 3, l. 23-44; c. 5, l. 10-42; and c. 7, l. 28-42).

There is absolutely no mention or suggestion in Park of processing a first signal, which includes a voice component, to derive a harmonic feature of the voice component. Unsurprisingly, since no such harmonic feature is derived in Park, Park also does not teach or suggest deriving an echo reduced signal by processing a second signal, which includes an echo component correlated to the first signal, to at least partly remove from the second signal at least one frequency component related to the harmonic feature of the voice component.

– Katayama –

Katayama describes an echo canceller including an echo cancelling section that subtracts an echo replica signal from a transmission voice signal to remove echo therefrom. The echo replica is estimated based on a buffer-delayed version of a filtered signal produced by a filtering section that removes a passband of frequency components, high frequency components, or low frequency components of a power-controlled reception voice signal (c. 4, l. 17-23, 31-33 and 60-67; c. 5, l. 1-8; and c. 12, l. 4-18).

There is absolutely no mention or suggestion in Katayama of processing a first signal, which includes a voice component, to derive a harmonic feature of the voice component. Since no such harmonic feature is derived in Katayama, it is not surprising that Katayama also does not teach or suggest deriving an echo reduced signal by processing a second signal, which includes an echo component correlated to the first signal, to at least partly remove from the second signal at least one frequency component related to the harmonic feature of the voice component.

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– Benyassine –

Benyassine describes an echo detection/cancellation system that compares pitch information about a far-end talker's speech signal to that of an unknown received signal in order to determine whether the unknown received signal is an echoed version of the far-end talker's speech signal or contains a speech signal of a near-end talker (i.e., a double talk signal). Simply put, Benyassine's system uses pitch information to determine whether an unknown received signal contains echo or double talk. Benyassine's system has an adaptive filter that produces an estimated echo signal based on the far-end talker's speech signal and on an error signal estimating an error in the filter's estimation of the echo. The system removes the estimated echo signal from the unknown received signal. When a double talk signal is detected, the adaptive filter's adaptation process is stopped (c. 3, l. 34-44; c. 4, l. 28-37 and 55-64; c. 4, l. 64 to c. 5, l. 23; c. 5, l. 63 to c. 6, l. 6; c. 6, l. 62 to c. 7, l. 5).

Benyassine's system does not derive an echo reduced signal by processing a given signal to at least partly remove from the given signal at least one frequency component related to a harmonic feature of a voice component of another signal that is correlated to an echo component in the given signal.

– Osovets –

Osovets describes an audio conferencing system that includes an echo canceller. The echo canceller has an adaptive filter that produces an estimated echo signal based on a received far-end signal and an adaptive model of the local echo path. The estimated echo signal is subtracted from a received near-end signal to produce an output signal for transmission to the far-end (c. 2, l. 40-49; c. 3, l. 23-33).

There is absolutely no mention or suggestion in Osovets of processing a first signal, which includes a voice component, to derive a harmonic feature of the voice component. Unsurprisingly, since no such harmonic feature is derived in Osovets, Osovets also does not

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teach or suggest deriving an echo reduced signal by processing a second signal, which includes an echo component correlated to the first signal, to at least partly remove from the second signal at least one frequency component related to the harmonic feature of the voice component.

In light of the foregoing, it is respectfully submitted that none of Hosoi, Park, Katayama, Benyassine, and Osovets teaches or suggests the above-emphasized elements of claims 1, 10, 22 and 41. Accordingly, none of these references anticipates claims 1, 10, 22 and 41. The Examiner is thus respectfully requested to withdraw the rejections under 35 USC 102 of claims 1, 10, 22 and 41, which are believed to be in condition for allowance.

3. Rejection of Claims 2 to 4, 11 to 13 and 23 to 25 under 35 USC 103

On pages 4 and 5 of the Office Action, the Examiner rejected claims 2 to 4, 11 to 13 and 23 to 25 under 35 USC 103(a) as being unpatentable over Hosoi in view of U.S. Patent Application Publication 2003/0138061 to Li (hereinafter referred to as "Li").

As discussed below, the Applicants respectfully submits that claims 2 to 4, 11 to 13 and 23 to 25, as effected by the present amendment, are in condition for allowance and respectfully requests the Examiner to withdraw the rejection of these claims.

Firstly, each of claims 2 to 4, 11 to 13 and 23 to 25 depends on one of claims 1, 10 and 22 and thus incorporates by reference all the elements of that claim, including those already shown above as being missing from Hosoi, namely:

- processing a first signal, which includes a voice component, to derive a harmonic feature of the voice component; and
- deriving an echo reduced signal by processing a second signal, which includes an echo component correlated to the first signal, to at least partly remove from the second signal at least one frequency component related to the harmonic feature of the voice component.

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Secondly, it is respectfully submitted that Li also fails to teach or suggest the above elements of claims 1, 10 and 22 that are missing from Hosoi.

Specifically, Li describes a signal processing system including, amongst various things, an echo canceller having a specific construction that uses an FIR filter (parags. 96-129). Li is totally unconcerned with and does not teach or suggest processing a first signal, which includes a voice component, to derive a harmonic feature of the voice component for echo cancellation. With respect to the specific passage of Li (parag. 197) referred to by the Examiner, this passage refers to pitch estimation for *lost voice packet recovery* (parags. 192-199; in particular, parag. 197). This recovery of lost voice packets has nothing to do with *echo cancellation*.

Notwithstanding Li's failure to teach or suggest processing of the first signal to derive a harmonic feature of the voice component for echo cancellation, Li in no way teaches or suggests deriving an echo reduced signal by processing a second signal, which includes an echo component correlated to the first signal, to at least partly remove from the second signal at least one frequency component related to the harmonic feature of the voice component.

In light of the above, it is respectfully submitted that at least one element of each of claims 2 to 4, 11 to 13 and 23 to 25 (via their dependency on claims 1, 10 and 22) is neither taught nor suggested by Hosoi and Li, whether taken separately or in combination. Therefore, the Applicants respectfully submit that at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j)² is not satisfied. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claims 2 to 4, 11 to 13 and 23 to 25, which are believed to be in condition for allowance.

² For the Examiner to establish a *prima facie* case of obviousness, three criteria must be considered: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings, (2) there must be a reasonable expectation of success, and (3) the prior art references must teach or suggest all of the claim limitations. MPEP §§ 706.02(j), 2142 (8th ed.).

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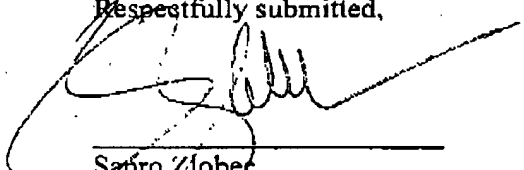
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Claims 1 to 26 and 28 to 58 are believed to be in condition for allowance. Favourable reconsideration is requested. Early allowance of the present patent application is earnestly solicited.

If the claims of the present patent application are not considered to be in full condition for allowance, for any reason, the Applicants respectfully request the constructive assistance and suggestions of the Examiner in drafting one or more acceptable claims or in making constructive suggestions so that the application can be placed in allowable condition as soon as possible and without the need for further proceedings.

Respectfully submitted,

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Samro Zlobec

Reg. No. 52,535

Agent for the Applicants

SMART & BIGGAR
1000 De La Gauchetière Street West
Suite 3300
Montreal, Quebec H3B 4W5
CANADA
Telephone: (514) 954-1500
Fax: (514) 954-1396